BUSINESS AND PROFESSIONAL COURSES
DIVISION OF EXTENSION — UNIVERSITY OF TORONTO

In co-operation with

THE CANADIAN NUCLEAR ASSOCIATION

HEAVY WATER REACTOR DESIGN PRINCIPLES

1967-1968

A 20 Session Course
Wednesdays at 7:00 p.m. Commencing October 11
Room 304, Galbraith Building
Fee: $60.00

COURSE DIRECTOR
DR. D. G. ANDREWS
Professor of Nuclear Engineering

This course is concerned with the heavy water reactor basic to the Canadian nuclear power program. Its purpose is to give an overall picture of heavy water reactor design to engineers and designers who are entering the industry for the first time, or who have concentrated on one area of specialized interest and wish to view their work against the background of the total project. Lecturers are prominent specialists in the field.

The course begins with an outline of the Canadian program of nuclear power productions, with special reference to the growth of demand, available methods of power production and the roles of Atomic Energy of Canada Ltd. and the Power Commissions of Ontario and Quebec. Next, the whole power plant, comprising nuclear reactor, steam boiler, turbine and generator, is reviewed as an integrated system. A nuclear power station must be economically attractive, so consideration is then given to economics and costs.

A section on basic reactor science follows, in which attention is given to system thermodynamics — the special problems of getting the best conversion of heat to work — and heat transfer as applied particularly to the fuel elements, which operate under conditions substantially more exacting than those in a conventional plant. Attention is given to basic reactor physics and to the various physical problems which arise in the heavy water type of reactor.

In an approach to the detailed design, first consideration is given to the unusual metallurgical requirements, to the choice of materials of construction, and to chemical and corrosion problems involved in selecting and operating materials in the reactor environment. Individual components of the installation are then considered in some detail, commencing with the heat transport system, that is, the means of releasing the heat in the reactor core, transporting it by means of pumped coolant, and delivering it to the boiler for conversion of water to steam. The handling of the steam and its conversion to work are dealt with in the section on turbines and auxiliaries. Other sections deal with the various types of mechanical components, the whole system of sensors and controls, with specially designed computers, the highly specialized areas of fuel specification and design, and the automatic machinery used in on-load refuelling. The interrelation with human beings is taken into account in lectures on radiation shield design, on health physics equipment and procedures, and on the analysis of hazards to the environment consequent upon operation of a nuclear reactor.

To close, a forward-looking lecture on the future prospects for the Canadian nuclear power program is given by a top-level Canadian atomic scientist.

No specific textbooks are recommended or used, but lecture notes are distributed where possible and reference is made to publications in the AECL series. Visits are arranged on request, to local nuclear installations.

For additional information or application forms, please contact:

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